

On the occurrence of the genus *Callocardia* in Australian waters, with the description of a new species

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ABSTRACT

Callocardia thorae, new species, described from twelve dredging stations off the central part of the east coast of Australia between the Capricorn Channel, Queensland and North Solitary Island, New South Wales, represents the first report of the occurrence of the bivalve genus *Callocardia* in Australian waters, and apparently the first south of the Gulf of Siam. The average depth of the species along the east coast is 139 metres.

INTRODUCTION

While viewing the extensive molluscan collections of Mrs Thora Whitehead in Chapel Hill, Brisbane, Queensland, the writer had his attention drawn to an unusual species of Bivalvia that she had not been able to identify. The general shape suggested the genus *Glossus* Poli, 1795, but it lacked the strongly protruding prosogyrate umbones characteristic of that form, and possessed a well-developed, but weakly impressed, pallial sinus and a rather unusual venerid hinge. Subsequent examination of the collections in the Australian Museum in Sydney revealed additional specimens. Comparison with other species in the collection, plus a review of the literature, has led to the conclusion that the form is a new species referable to the genus *Callocardia* A. Adams, 1864.

So far as the writer has been able to ascertain this is the first record of the genus from Australian waters, and apparently the first south of the Gulf of Siam, from which Lyngé (1909: 229) recorded "*Cythærea (Caryatis) isocardia*, Sow." [= *Callocardia guttata* A. Adams, see discussion below].

The writer is much indebted to Mrs Whitehead for calling his attention to this form and for the gift of specimens and the furnishing of information concerning them and others in her collection.

TAXONOMY

Family VENERIDAE Rafinesque, 1815
 Subfamily PITARINAE Steward, 1930
 Genus CALLOCARDIA A. Adams, 1864
Callocardia A. Adams, 1864: 307.

Type species, by monotypy: *Callocardia guttata* A. Adams, [= *Cytherea (Caryatis) isocardia* G.B. Sowerby, 1888 (unnecessary new name for *Callocardia guttata* A. Adams, not preoccupied by *Cytherea guttata* Römer, not described until 1866, *vide* Dall, 1902: 353)] Type locality: Off Quelpaart Isl., Korea 48 fathoms [=88 m.].

"*Caryatis* Römer," G.B. Sowerby, 1888: 213 [non Römer, 1862: 58; substitute name for *Pitar* Römer, 1857 (type: *Venus tumens* Gmelin); not *Caryatis* Hübner, 1816 (Lepidoptera)].

Discussion: *Callocardia guttata* was described by Adams (on the basis of a single left valve) without illustration. Consequently there has been lack of agreement as to the nature of the type specimen. Dall (1890, pl. 10, fig. 5) first provided a drawing by E.A. Smith showing the hinge and outline and Habe (1961, pl. 1, fig. 11) gave one of the exterior made by Prof. Jiro Makiyama. The Dall figure shows a produced anterior end with measurements indicating an umbone near the anterior one-third of the total length, but the Makiyama *in* Habe figure suggests a higher, more rotund outline, with the umbo near the anterior one-sixth of the length. The illustrations of later collected specimens given by Kuroda (1952, text figs. 3, 4; obtained from "40 fathoms (?)" in the Bungo Strait) and by Habe (1977, pl. 2, figs. 15, 16; off Asuzaki, Wakayama Pref., Honshu, from "about 150 m. deep") agree more with the Dall drawing relative to the position of the umbones, but the Habe specimen seems to have a distinctly more narrowed and sharply rounded anterior end.

Examination of the type specimen in the British Museum (Nat. Hist) indicates that the Dall figure is more nearly of the proportions of the type specimen than is that of Makiyama *in* Habe, but neither is in complete agreement. As may be seen from the photograph of the type (text-figure 1) the umbo is at the anterior $\frac{1}{4}$ of the length of the specimen.

There has been much uncertainty as to the systematic position of *Callocardia*. Most of it appears to have stemmed from a question as to the presence or absence of lateral teeth. Adams states in his description "*dentis lateralibus nullis*" and, in his discussion, adds: "The complicated nature of what I have termed the anterior cardinal tooth . . . together with the absence of lateral teeth, will distinguish *Callocardia* from the *Isocardia* of Lamarck [= *Glossus* Poli, 1795]." Furthermore, Makiyama's drawing of the hinge of the type specimen gives no indication of a lateral tooth.

The illustration of the hinges given by Smith (1900:81, fig.1), based upon two perfect specimens collected in Hong Kong and originally reported by Sowerby (1888:212), does not, in the words of Jukes-Browne (1913: 340), "clearly bring out the existence of the anterior lateral in the left valve, but Mr Smith informs me that it is there — 'an erect acute tooth rising from the margin of the hinge plate'." Examination of the holotype shows that there is an anterior elongation of the ventral end of the median cardinal that terminates in a small projection (near the lunular margin), which fits into a corresponding pit in the opposite valve, thus functioning as a lateral tooth (see plate 1, fig. 1d).

The unusual nature of the hinge structure, which has been the basic reason for the uncertainty regarding the systematic position of *Callocardia*, was well discussed by Dall (1903: 1237): "It is known from the researches of Bernard that the anterior and posterior teeth of the same valve are originally continuous laminae; thus the superior lamina of the left valve breaks up into the posterior cardinal and the anterior lateral, while the inferior lamina divides to form the two other cardinals of the valve. Ordinarily the primary connections are lost sight of in the adult, and the cardinal teeth appear to spring from an imaginary centre under the hinge-margin above them. In certain groups such as *Callocardia* . . . or *Veneriglossa*, however, the anterior and posterior right cardinals remain connected as well as the anterior and middle left cardinals, and when the valves are closed the former are inserted above the latter and between them and the hinge-margin, while the middle right cardinal fits in below the united pair of the left valve, thus giving an odd look to the hinge, the reason for which requires some study to recognise. As a whole the . . . group represents an earlier type than the typical *Venus* and one with somewhat more archaic hinge characters. Of these *Callocardia* is unquestionably the least developed."

CALLOCARDIA THORAE H.E. Vokes, sp. nov.

Plate 1, figures 1a-d, 2a-c, 3

Description: Shell large for the genus, strongly inflated, almost subspherical in shape, reminiscent of some forms referred to the Glossidae in external appearance and proportions, but having a less deeply excavated lunule margined by a well-developed groove, and strongly inflated, prosogyrate umbones not as gyrate and protruding, but situated between anterior one-third and one-fourth of total length; dorsal valve margin broadly arched, anterior and ventral margins rounded, the anterior more sharply so than the ventral; posterior straight to slightly medially concave as a result of broad, very shallow, postero-dorsal umbonal groove; external surface smooth, marked only by growth lines sometimes forming fine concentric rugae near ventral margin of larger specimens; colour white, with small radially aligned tan to yellowish-brown spots on some valves during earlier growth stages, often as a single row of three or four spots adjacent to posterior dorsal margin — on no specimens examined extending to the posterior or ventral margin, present on the median as well as posterior dorsal surfaces of only one specimen (see fig. 3) and none showing any anterior ones. Remnants of a thin, chalky intritacalx present on all specimens, usually preserved in lunular area under umbones and towards ventral and posterior margins.

Hinge with three cardinal teeth and an anterior lateral tooth in each valve, all borne on a narrow hinge-plate marked by an unusually sinuate, upturned ventral margin; anterior and median cardinals of left valve of a continuous structure, flexed dorsally; anterior cardinal trending vertically and median postero-ventrally; posterior cardinal narrow and linear, separated from median one by a deep socket; anterior and posterior cardinals of right valve also continuous dorsally, posterior one bifid, anterior slender, lamellose and ventrally truncated; continuity between the two thinned, somewhat tenuous above depression, which receives the flexed "hook" connecting the two left cardinals; median right cardinal relatively short, almost a dorso-ventrally elongated narrow nodule, located adjacent to ventral margin of hinge-plate; ventral truncation of anterior cardinal resulting in a sharply rounded continuation of the socket between anterior and median cardinals; this continuation receives the anterodorsally trending upturned margin of left hinge-plate, latter narrower in this area than that of the right valve. Left anterior lateral tooth an erect acute nodule rising immediately dorsal to, and attached to, the upturned ventral rim of hinge-plate; in the right valve a pair of nodes, the larger ventral one erect, rising in a position similar to that of left lateral, with the smaller node projecting from dorsal side of plate into the medially depressed central portion of that structure, the two nodes constricting the depression and forming anterior to them, a pseudo-socket for the reception of the lateral from left valve. Ligament opisthodontic, narrowly elongate, deeply incised between valve margin and hinge-plate with ligament almost completely internal.

Inner margins of valves smooth, slightly thickened ventral to pallial line; pallial sinus not well demarked, broadly triangular with a sharply rounded apex; adductor scars subequal, posterior roundly ovate, anterior narrowly elongate with dorsal end extending onto ventral side of upturned anterior end of hinge-plate; outer sides of both scars very near valve margin.

Holotype, Australian Museum No. C.131238; length 25.6 mm, height 23.2 mm, diameter (paired valves) 20.4 mm; Fisheries Research Vessel "Kapala", 134 metres, 28°13-18'S., 153°53'E., off Danger Point, New South Wales.

Paratype, Australian Museum No. C.131239; length 23.7 mm, height 23.0 mm, diameter (paired valves) 22.3 mm; HMAS "Kimbla", stn. 20: 115 metres, 23° 08.4' S., 152° 12.3'E., 29 km (18 miles) northeast of North Reef, Queensland.

Paratype, Australian Museum No. C.131240; length 28.3 mm, height 25.8 mm, diameter (left valve) 11.5 mm; Fisheries Research Vessel "Kapala", 146 metres, 28° 16-17'S., 153° 50-51'E., East of Tweed Heads, New South Wales.

Discussion: The relatively few specimens of *Callocardia guttata* available make it difficult to give a precise comparison between that form and the present species. *Callocardia thorae* appears to be distinguished from *C. guttata* primarily in being a larger species; the average size of the 7 paired valve specimens, plus 7 left and 4 right valves available for study is: length 24.0 mm, height 21.9 mm, diameter 20.0 mm; the average of the type, plus measurements given in the literature, for *C. guttata* is: length 18.8 mm, height 16.45 mm, diameter (paired valves) 15.1 mm. In addition,

the hinge-plate of *C. thorae* is almost twice as broad, and the pallial line is much closer to the valve margin; the pallial sinus is somewhat broader ventrally, much more sharply rounded at its dorsal extremity and less anteriorly projecting overall.

Distribution: The specimens listed above, which were the basis for the present study, all come from off the central part of the east coast of Australia. The most northern records are from the Capricorn Channel off the central Queensland coast, and the most southern one is of a paired valve specimen dredged by the Fisheries Research Vessel "Kapala" northeast of North Solitary Island, 29° 47-50'S., 153° 38-39'E. The specimens from the twelve stations within this interval came from depths between 115 and 165 metres, with the average depth being 139 m.



Text-figure 1. *Callocardia guttata* A. Adams, holotype BM(NH). Length 18.5 mm, height 17.1 mm; locality, Island of Quelpaart, 48 fathoms.

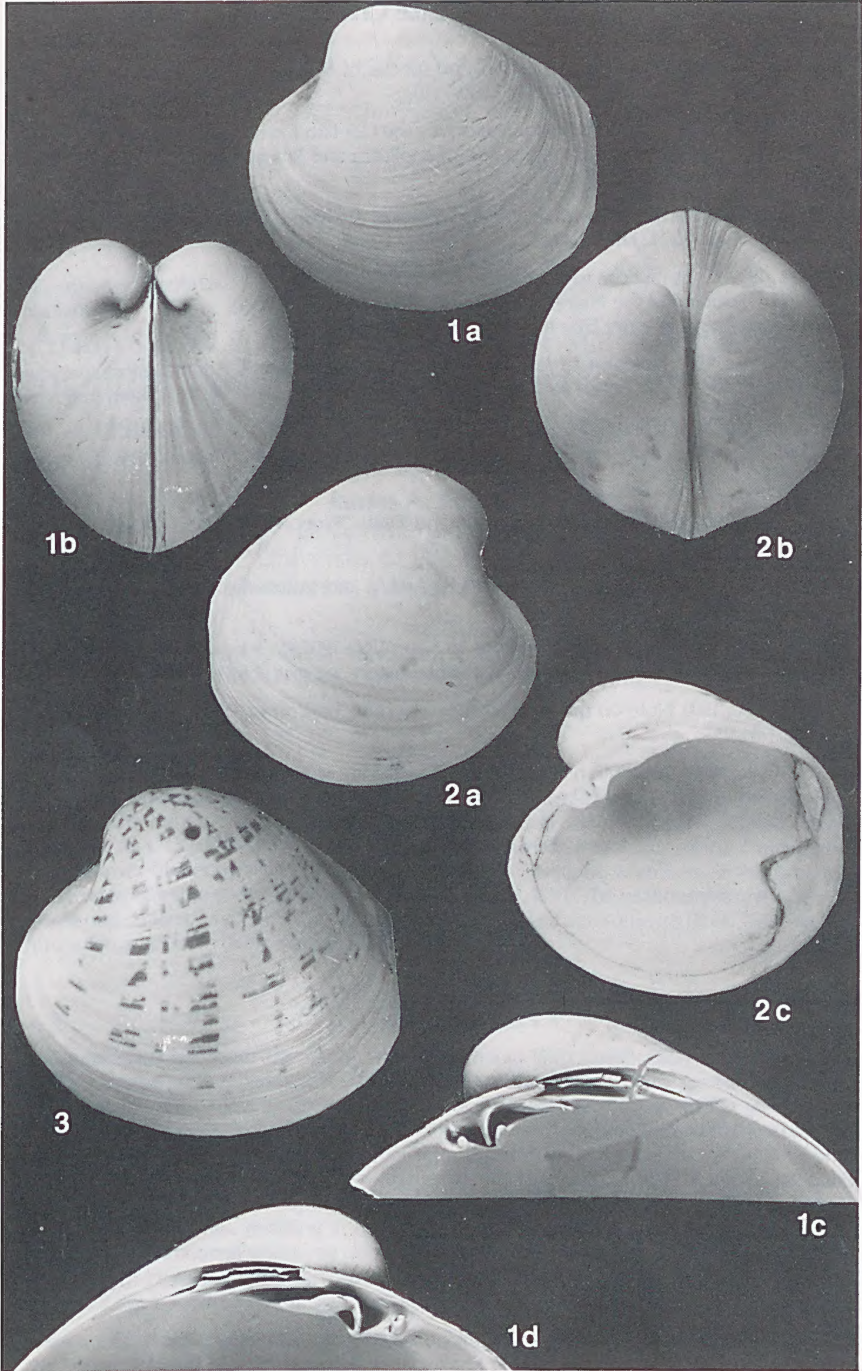
In his discussion of the form from the Gulf of Siam that he identified as *Cytherea* (*Caryatis*) *isocardia* Sowerby (= *Callocardia guttata* Adams — see above) Lyngø (1909: 133) stated: "Though the shell which I have before me . . . differs somewhat in form from the *C. isocardia*, Sow., I can scarcely be wrong in referring it to this species." Unfortunately he did not figure his specimen, but it is to be noted that the dimensions he cites for it, "Long. 26 mm., alt. 22 mm., crass. 20 mm." are more similar to those of the present species, being larger and apparently somewhat more inflated than is *C. guttata*.

If this form should prove to be referable to *C. thorae* the range of this species will be extended considerably to the north.

CALLOCARDIA THORAE H.E. Vokes, sp. nov.

Plate 1

1. Holotype, Australian Museum No. C.131238; la, exterior of left valve, x2; lb, anterior view of paired valves, x 2; lc, hinge of right valve, x 3.5; ld, hinge of left valve, x 3.5. Off Danger Point, New South Wales, depth 134 metres.
2. Paratype, Australian Museum No. C.131239; a proportionately shorter, more obese specimen; 2a, exterior of right valve, x 2; 2b, dorsal view of paired valves, x 2; 2c, interior of right valve, pallial line, pallial sinus and adductor muscle scars delineated before photography, x 2, 29 kilometres northeast of North Reef, Queensland, depth 115 metres.
3. Paratype, Australian Museum No. C.131240; exterior of left valve of largest specimen in collection, and the only one with colour pattern extending on to the median as well as posterior dorsal surface, x 2. Off Tweed Heads, New South Wales, depth 146 metres.



LITERATURE CITED

- Adams, Arthur, 1864. On some new genera and species of Mollusca from the seas of China and Japan. *Ann. and Mag. Nat. Hist.*, (3) 13:307-310.
- Dall, W.H., 1890. Scientific results of explorations by the U.S. Fish Commission steamer "Albatross." VII. Preliminary report on the collection of Mollusca and Brachiopoda obtained in 1887-88. *Proc. U.S. Nat. Mus.*, 12 (773):219-362.
- Dall, W.H., 1902. Synopsis of the family Veneridae and of the North American recent species. *Proc. U.S. Nat. Mus.* 12 (1312):335-412.
- Dall, W.H., 1903. Contributions to the Tertiary fauna of Florida with especial references to the siliceous beds of Tampa and the Pliocene beds of the Caloosahatchie River . . . Part IV. Concluding the work. *Trans. Wagner Free Inst. Sci.*, 3 (6):1219-1654.
- Habe, Tadashige, 1961. Notes on some Japanese Mollusca described by A. Adams, whose specimens are deposited in the British Museum (Natural History). (No. 1). *Prof. Jiro Makiyama Mem. Vol.*, 191-205.
- Habe, Tadashige, 1977. New and little known Bivalves of Japan. *Jap. Jour. Malac. (Venus)*, 36 (1):1-13.
- Jukes-Brown, A.J., 1913. On *Callista*, *Amiantis*, and *Pitaria*. *Proc. Malac. Soc. London.* 10 (6):335-347.
- Kuroda, Tokbei, 1952. On *Callocardia guttata* A. Adams and *Vesicomya katsuae* n. sp. *Jap. Jour. Malac. (Venus)*. 17 (1):1-5.
- Lynge, Herman, 1909. The Danish Expedition to Siam, 1899-1900. IV. Marine Lamellibranchiata. *D. Kgl. Danske Vidensk. Selsk. Skrifter. (7. Raekke naturv. og math.)* 5 (3):99-299.
- Smith, Edgar A., 1900. Note on the genera *Callocardia* and *Vesicomya*. *Proc. Malac. Soc. London.* 4(2):81-83.
- Sowerby, G.B., 1888. Description of fourteen new species of shells from China, Japan and the Andaman Islands chiefly collected by Deputy Surgeon General R. Hungerford. *Proc. Zool. Soc. London* (1888):206-213.